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THE DEVELOPMENT OF THE
FEDERAL ROLE IN THE SUPPORT OF
MEDICAL RESEARCH*

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THE growth in Federal funds for medical research and in the policies and decisions under which they are expended constitutes a most significant influence upon national medical research activities, medical education, and to a large degree the financial status of medical schools and universities. Questions which this development has thrust before us have become prime issues of national policy. The manner in which these questions are answered will have far-reaching consequences, not only for medical research but also for medicine as a whole.

I should like to trace briefly the origins of this Federal responsibility and the development of programs for the support of research through grants. My reading and observations on the historical backgrounds are, of course, those of an amateur. It is my intention to sketch some of the important events and the context in which they arose, in the interest of better understanding and more reflection upon the important problems before us.

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The Present Support of Medical Research

Until modern times medical research was supported by the Federal Government almost solely in response to specific problems associated with national emergencies. Current Federal programs go far beyond this. Efforts to replenish the store of basic knowledge are broadly recognized as essential to the success of research in problem areas. As a result, there has been a transition from the earlier pattern of supporting ideas and projects to the support of men of known productivity and achievement. Thus, the full flowering of programs based upon this broad view requires, on the part of the supporting agency, a full and mature sense of responsibility for both the requirements of the public interest and the needs of science and scientists.

What is the current level of medical research support, and what in general are the sources? It is estimated that in 1959 the total national expenditure for medical research from all sources, public and private, will total \$575 million. A little over half (51 per cent) of this amount will come from the Federal Government. The remainder will come from a variety of nonfederal sources, including industry, the foundations, voluntary agencies, and other private and public organizations. In contrast, national medical research expenditures in 1940 totaled only \$45 million, and the Federal share was less than 10 per cent.

As this demonstrates, the explosive growth of Federal medical research expenditures is largely a postwar phenomenon. However, the pattern of relationships among private and public institutions in which current programs operate has prewar precedents and origins, some of which emerged in the last century. These events, in turn, were a consequence of forces and influences that shaped fundamentally our development as a people and a Nation.

Early Federal Attention to Medical Research

Only in a full-scale history could one hope to delineate and assess adequately all the influences that have shaped the role of the National Government in medical research. An outstanding work in this respect is *American Medical Research* by Dr. Richard H. Shryock. This evocative and perceptive inquiry into the interplay of economic, social, political and scientific forces in relation to medical research was published in 1947 under the sponsorship of this Academy's Committee on Medicine and the Changing Order.

Federal interest in science and scientific activities is by no means new. There has been an almost constant interplay between government and scientific activities from the beginning of our Federal Republic. A. Hunter Dupree, in his superb study *Science in the Federal Government*, makes the point clear:

“From the beginning the Federal Government has rendered honor to science and profited from it. . . . Through all the twists and turns of the political history of the United States and through the immense changes wrought by 150 years of rapidly expanding scientific knowledge, the policies and activities of the Federal Government in science make a single strand which connects the Constitutional Convention with the National Science Foundation.”

You will remember that this nation was born in the “Age of Reason”. Our Constitution was designed and our early development guided by men whose philosophical views reflected the political and scientific ferment of the 18th century. The names of Franklin, Jefferson, Rush and Rittenhouse are indicative of the kinds of interests and viewpoints that attended early government-science relationships. Much of this interest was directed toward the pressures of our frontier, internal improvements, and the basic agrarian economy of the day. These concerns dominated the development of national scientific relationships for the better part of the 19th century.

During the first half of that century, medicine and the beginnings of medical science were chiefly matters for individual activity and private support. There was little that could be called medical research. The medicine of the day was dominated by theoretical concepts that explained all disease in terms of single pathological systems and discouraged systematic inquiry and observation.

The impetus for change came primarily from Europe. Thus American medicine in the past century reflects the British influence at the beginning, the French viewpoints in the pre-Civil War period, and German developments during the latter half.

The United States Public Health Service

In this early background, one event of significance to the later role of the Federal Government in medical research appears. In 1798 the Fifth Congress passed an act to provide for the care of sick and disabled

merchant seamen. This law, providing for the establishment of a series of Marine Hospitals, constitutes the legal beginnings of the United States Public Health Service. It was not until late in the century, however, that the organization created by this legislation, then known as the Marine Hospital Service, appeared in any meaningful role in the national medical research scene.

The Geological Survey and the U.S. Department of Agriculture

During the latter part of the 19th century, the relationships of science in government emerged first in connection with problems of land management and natural resources and, secondly, in the growth of agricultural science and the development of the Department of Agriculture. Both of these series of events have had real meaning for the later development of Federal medical research.

John Wesley Powell, geologist, explorer, prophet of the dust storm, and bureaucrat of the 1880's, developed a philosophy of government relationships to science in fighting through the role and functions of the Geological Survey. The establishment of this professional and scientific organization provided basic precedents for a clear Federal role in scientific activities. The biological research activities instituted by the Department of Agriculture and the evolution of the Agricultural Research Program, with its State and land-grant college relationships, contributed to the substance of medical sciences through research. It also provided a pattern of organization and Federal-State cooperation which has greatly influenced other Federal operations.

The State Boards of Health and the American Public Health Association

It is in the post-Civil War scene that the beginnings of a broad national health and medical research role for the Federal Government appear. This was a period of great interest in public health in the states and among physicians and public officials. The first modern State Board of Health was set up in Massachusetts in 1869. The American Public Health Association was organized in 1872.

The National Board of Health

In 1879 a bill passed the Congress, creating a National Board of Health. I wish to dwell on the establishment of this Board for a moment because the activities it undertook constitute the first organized, com-

prehensive, national medical research efforts of the Federal Government.

The Board was set up to deal with a practical public health problem. In 1878 a severe yellow fever epidemic had revealed the inadequacy of existing means for dealing with communicable diseases of this nature. The board was comprised of seven members appointed by the President. It included representatives of the Army, Navy, Marine Hospital Service and the Justice Department. Significantly, one of its functions was to "Obtain information on all matters of public health". The original bill also provided authority—deleted before enactment—for grants-in-aid to State Boards of Health.

The record of this Board is remarkable. Among the able men appointed to it was John Shaw Billings, an Army Medical Officer. Billings was a distinguished intellectual and administrator—a rare combination. He had conducted a study resulting in the reorganization of the Marine Hospital Service in 1870 and was to figure prominently in the national medical scene for the remainder of the century. Billings became Vice-Chairman of this National Board and its dominant and guiding member.

The Board initiated a research program, largely under the design and direction of Billings, which included the following activities:

1. Dispatch of a yellow fever investigation commission to Cuba.
2. Revision of a standard nomenclature of disease.
3. Development of a vital statistics program in cooperation with the Tenth Census of 1880.
4. Conduct of field sanitary surveys.

Finally, the Board provided financial aid to scientists in universities through grants for the conduct of research on problems of interest to the Board. This, I believe, was the first use of the Federal grants-in-aid device for the support of research in nonfederal institutions. It was the beginning of the project grant system.

The Board, unfortunately, was short-lived. Its support of research, involving the expenditure of \$30,000 in all, was considered extravagant by the Congress. In administering national quarantine functions, the Board incurred the opposition of state agencies, private shipping, and interestingly enough, the Marine Hospital Service. In 1882 its appropriations were transferred to the Marine Hospital Service, which carried on the Board's quarantine functions, but did not continue its general program of public health research or the research grant program.

It was not until 1912 that the broad public health and medical research function exercised by the National Board was finally authorized for the Federal Government. The concept of Federal grants-in-aid for support of medical research in universities and research institutions, though revived briefly during World War I in connection with control of venereal diseases, was not incorporated into law until the National Cancer Act of 1937.

This sequence of events indicates clearly how the evolution of Federal activities is in fact limited by fundamental factors outside the control of bureaucrats. Not the general concepts of the role of the Federal Government, the state of science itself, nor the structure and scientific capacities of universities were developed in the 1880's to the point where a strong Federal effort in support of the medical sciences was comprehensible or feasible.

The United States Army

Following the National Board, the center of Federal medical research shifted to the Army. A small and gifted group of men under the influence of Billings and the leadership of Sternberg began a period of research given impetus by the exciting developments in bacteriology emanating from Europe and the work of Pasteur and Koch. The intensive work of Army scientists on yellow fever had its origins at this time, culminating in the dramatic achievements of Reed and Gorgas.

Philanthropy and the Universities

In the latter part of the 19th century, the Federal role in the medical sciences was viewed as limited to the problems involved in the control of epidemic disease. The greatest promise for medical research lay in private support and the use of the universities. Three major circumstances significant for medical research emerge at this time:

First were the developments in the medical and related sciences and the attendant resurgence of interest in science and research brought about by the discoveries of Pasteur, the theories of Darwin, the growing sciences of bacteriology, physiology and pharmacology, and the new concepts of the specificity of disease identification and cause.

Second was the importation of the concept of graduate study in the sciences, following the German model. This was initiated at Johns Hopkins and spread rapidly in succeeding decades.

Third was the accumulation of great private fortunes that were to be made available for the support of science and education under the influence of Andrew Carnegie's "Gospel of Wealth"—the philanthropic return of profits to society as the obligation of the wealthy.

Thus began the great period of private support of higher education and the sciences, soon to be effected through establishment of philanthropic foundations.

The transformation of private giving from help-the-needy to imaginative, constructive philanthropy aimed at strengthening the fundamentals of our society was the feat of a few foundations and farsighted individuals. The Flexner Report revolutionized medical education. And the Rockefeller Foundation pioneered in new forms of support for science—first the underpinning of whole institutions and later the support of projects. These developments have had tremendous and generally unrecognized effects upon the later development of Federal activities.

Federal Research in Public Health Programs

A small event in this epoch which marks a beginning must be noted. In 1887 a young Marine Hospital Service Officer, J. J. Kinyoun, returned from Europe inspired by what he had seen in the German research laboratories. In that year he set up a small bacteriology laboratory in the Marine Hospital on Staten Island. This laboratory, later designated as the Hygienic Laboratory, was moved to Washington, where it grew slowly, concentrating on problems of infectious diseases.

In the first decade of the 20th century, there was a second period of intense national concern with public health problems and the need for a stronger Federal role. These developments were a part of the beginning reactions to the economic dominance of the large private concentrations of wealth. There was an increasing tendency to view the Federal Government as a means of exercising social control. The Progressive movement led by Teddy Roosevelt, the struggles over pure food and drug legislation, and the conservation of natural resources were reflections of this new viewpoint.

Federal health functions were substantially modified in the process. In 1902 an act was passed changing the name of the Marine Hospital Service to the Public Health and Marine Hospital Service. Shortly thereafter, a biologic control function was added. In 1906 the Food & Drug Act was passed. Further efforts were under way for the creation of a

comprehensive national health agency, and several bills for this purpose were introduced into the Congress. President Taft urged the establishment of such an agency in two successive State of the Union messages. These broad proposals were defeated by a vigorous combination of antivivisectionists, Christian Scientists and medical sects. In compromise, the Act of August 14, 1912 was passed, slightly broadening Federal health responsibilities.

This act for the first time stated in law the responsibility of the Public Health Service to "... study and investigate the diseases of man and conditions influencing the propagation thereof ..."

Grants to Scientists in Universities

Not until World War I was the device of supporting medical research through grants-in-aid to university scientists resumed. The Chamberlain-Kahn Act of 1918 for the study and control of venereal diseases authorized an annual appropriation of \$285,000 for each of three years to be used for research. These studies were carried out by the Interdepartmental Social Hygiene Board and the Public Health Service's Division of Venereal Disease, both created by the Act. The Board made grants to some twenty-five institutions for studies related to venereal disease. More importantly, it clearly established the precedent for the Federal Government to seek the assistance of the research scientists of the nation through the form of Federal grants-in-aid in matters determined by Congress to be in the public interest.

The National Institutes of Health

In 1930 Congress passed an act reorganizing and expanding the functions of the Hygienic Laboratory, changing its name to the National Institute of Health.* This law also authorized for the first time the establishment of research fellowships. The Service's research function, however, remained strictly intramural.

The 1930's

An interesting and almost-forgotten phase of the development of the Federal Government's role in the support of science and research was the depression activities of the WPA (Works Progress Administration). Under its Federal Research Projects Program, Federal funds were

* Changed to National Institutes of Health in 1948.

given to aid scientific and research activities in State universities, public institutions, and agencies. It is interesting to read today the names of the investigators whose work was supported by Federal funds in those lean years. Among them are many of the outstanding scientists of the country today.

The New Deal brought about profound changes in the concept of the role of the Federal Government. Among these was the idea that the Government had a responsibility to act in major problems affecting the national health. In this context the National Cancer Act was passed in 1937. It established the National Cancer Institute and for the first time provided permanent authority for making grants in support of medical research in nonfederal organizations.

The research support program of the Cancer Institute in pre-World War II days was modest. Between 1938 and 1940 it awarded 33 grants in the amount of \$220,000.

World War II and the Postwar Period

World War II demonstrated to the nation the immediate and potential significance of science and technology in our national destiny—as epitomized in the successful development of the Atomic Bomb. Large amounts of Federal money were spent on research to solve war-born problems. A major influence in this program was the Office of Scientific Research and Development under the direction of Dr. Vannevar Bush.

In response to President Roosevelt's inquiry concerning the measures which the Federal Government should take to make research useful to the public and to aid research in nonfederal institutions in the postwar period, Dr. Bush prepared his now famous report, "Science, The Endless Frontier." The fundamental, and then-controversial, idea of this report was that the required impetus for research in the nation could come only from the Federal Government. He recommended the establishment of a National Research Foundation, with a research program to be carried out by grants or contracts with private institutions. Proposed for this agency was a maximum budget of \$122,500,000 after five years, of which \$20 million would be for the medical sciences. Many thought this level of expenditure visionary.

Dr. Bush's recommendation, modified in many ways, was finally enacted in 1950 as the National Science Foundation Act. This au-

thorized the National Science Foundation, which was established the following year, with responsibility for support of basic research.

During this immediate postwar period, several major changes occurred in the Federal structure for research in the life sciences:

The Public Health Service Act of 1944, reorganizing and recasting the Public Health Service statutes, provided broad authority for the conduct and support of all kinds of medical research. At the end of the war the remaining research-support program of the Office of Scientific Research and Development in the field of medical science was turned over to the National Institutes of Health to administer under this authority.

Legislation providing for new national institutes was enacted in rapid succession—the Mental Health Act in 1946, the Heart Act and the Dental Research Act in 1948. Other institutes now comprising the National Institutes of Health were established under authority of the Omnibus Research Act of 1950.

The Office of Naval Research undertook a broad program of support of university research in biology and medicine.

The Armed Forces Epidemiological Board extended its work.

A re-invigorated Veterans' Administration established firm and productive links between many of its hospitals and medical schools. This served as the basis for a strong medical research program.

The Atomic Energy Commission took responsibility for a broad spectrum of investigations relating to the effects of radiation upon biological systems.

As Dr. Charles V. Kidd of the National Institutes of Health pointed out in his recent book, *American Universities and Federal Research*, "The significance of the rapid and smooth assimilation of scientific activities, particularly those having to do with the support and purpose of research, by the operating parts of the Executive Branch and immediately after World War II, can hardly be overemphasized as a factor affecting Federal science policy."

Reasons for the Postwar Expansion in Research Support

What gave rise to this sudden broadening of Federal medical research activities? Popular recognition of the significance of science and research for the welfare of the nation was primarily responsible. The war had revealed the enormous economic capability of the nation and

the heights to which man's efforts can reach, particularly when aided by science and technology. A conviction that a significant portion of the resources of the nation could be productively directed toward the conquest of disease and for the well-being of man underlies these events. At the same time, economic developments were such that—for better or worse—neither private fortunes nor the resources of state and local governments were adequate to finance a large-scale medical research effort. And industrial spending had been applied largely to inquiries designed to increase profits rather than strengthen science generally.

Finally, the medical and biological sciences themselves matured rapidly in the war and postwar years. For the first time in the history of science, these fields of inquiry became ripe for intensive exploitation. The process of maturation has continued at an exponential rate, and the needs for financial support have risen more than proportionately.

We have, in short, been in an unprecedented situation in which public expectations have been translated into political pressures for action, at a time when extended support was indicated on scientific grounds. This happened in an era when the required funds could not be produced by private activity alone. These forces underlay the postwar development of the Federal role in medical research.

As a consequence, we have witnessed continued increases in the appropriation of funds by the Congress. Funds available to the National Institutes of Health for research grants alone rose from \$3.5 million in 1947 to \$97 million in 1957—nearly a 30-fold increase. During fiscal year 1960, NIH will expend almost \$200 million in the form of grants for research projects.

The Present National Structure for Research Support

This sudden acceleration in research support has presented NIH and, in a very real sense, the nation, with a new series of complex problems involving the fundamental relationships of the Federal Government, science, and the universities.

The first clear delineation of these issues was set forth by consultants to the Secretary of Health, Education and Welfare in the well-known Bayne-Jones Report* of two years ago. This group of distinguished

* The Advancement of Medical Research and Education through the Department of Health, Education and Welfare: Final Report of the Secretary's Consultants on Medical Research and Education. Government Printing Office, Washington, D.C., 1958. (Available from Office of Research Information, National Institutes of Health, Bethesda 14, Md.)

men concluded in summary that the nation could look forward to further increases in the magnitude of its medical research activities. They emphasized, however, that the prospect demanded further action in respect to the training of medical and research manpower and to the financial stability and independence of universities and medical schools. It may be noted that the national expansion of medical research as predicted in this report has already been exceeded. In this respect the Bayne-Jones Report has erred in the same way as many previous reports—notably, those of Bush, Steelman and Reed—that represented in their time bold visions of the years ahead. Consistently, the development of medical research and the Federal role have been grossly underestimated.

The major problems that loom before us center in three basic issues:

1. Finding means to contribute to the basic stability of institutions of higher learning in a manner that enhances their freedom and strengthens all their functions.
2. Providing mechanisms that will permit the development and support of stable careers for research investigators within the tenure systems of the universities.
3. Devising a way to work effectively with universities, medical schools, and research institutes as a whole in the development of policies and programs.

Our proposals for the payment of the full costs of research and for a system of Institutional Research Grants, drawn from the recommendations of the Bayne-Jones Research Committee, are directed to these ends. Developments in the current scene emphasize the importance of building broad support programs with total institutional needs clearly in view. The Public Health Service proposal for an institutional research program constitutes our first step in this direction, and may represent the beginning of a whole new trend in Federal support of science.

In the solution of the problems before us, we shall need the advice and guidance of all who have thoughtful concern not only with the means but also the purposes and ends of a national medical research effort.